

REMARKS

Upon entry of this amendment, claim 8 will be the only claim pending in the present application. Claim 8 has been amended to incorporate claims 11, 12 and 13, which have been canceled, claims 9 and 10 have been canceled, and support for the further amendment of claim 8 can be found, for example, on page 12, lines 32-34 of the present specification.

Entry of the above amendments is respectfully requested.

Initially, it is noted that Applicants' claim to foreign priority under 35 U.S.C. § 119 has not been acknowledged and that receipt of the certified copy of the priority document has not been confirmed. In addition, Applicants' claim to domestic priority (provisional application) and receipt of the translation of the provisional application have not been acknowledged.

Accordingly, the Examiner is respectfully requested to acknowledge Applicants' claims to both foreign and domestic priority, and to confirm receipt of the certified copy of the priority document and the translation of Provisional Application No. 60/247,991, filed July 10, 2001.

On pages 2-3 of the Office Action, claims 8-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ito et al. (JP 11-145518) in combination with Uemura et al. (U.S. Patent 6,500,689).

Applicants respectfully respond as follows.

The present invention relates to a method for producing a p-type gallium nitride-based compound semiconductor comprising producing a gallium nitride-based semiconductor layer doped with a p-type impurity, producing a catalyst layer on the

gallium nitride-based compound semiconductor layer, annealing the gallium nitride-based compound semiconductor layer and catalyst layer in an atmosphere containing no oxygen at a temperature of 200 to 600° C; stripping the catalyst layer completely and providing a p-side electrode on said p-type layer after annealing. In addition, the catalyst layer is stripped after annealing. The catalyst layer is a monolayer or multilayer film having a thickness of 1 to 100 nm and comprises Ni.

As discussed bridging pages 3-4 of the specification, by annealing the catalyst layer in an atmosphere containing no oxygen, the present invention provides good ohmic contact without incurring deterioration of the crystal and light-emitting layer or without causing contamination or generation of damages on the device surface.

Ito relates to a method of forming a semiconductor light-emitting device, and discloses a semiconductor device, in which a p-type GaN layer is formed, then a Co metal thin-film is formed on the p-type GaN layer, the p-type GaN layer and the Co metal thin-film are heat treated, and then the Co metal thin-film is removed. *See* English abstract. The Co film is annealed in an oxygen atmosphere, and the oxidized Co-film is then removed.

In contrast to Ito, the catalyst layer of the present invention formed on the gallium nitride-based compound semiconductor layer comprises a metal, alloy or metallic compound containing Ni. In addition, while Ito discloses annealing the Co film in an oxygen atmosphere, in the present invention, a gallium nitride-based compound semiconductor layer and catalyst layer are annealed in an atmosphere gas containing no oxygen at 200 to 600°C.

The Examiner also acknowledges that Ito does not disclose annealing in an atmosphere containing no oxygen, and cited Uemura as teaching depositing a Co layer on a p-GaN layer and then heat treating in either oxygen or nitrogen atmosphere to reduce contact resistance of p-type GaN (*see* abstract and *see* fig. 3, fig. 4 and 5 and related description). Accordingly, the Examiner takes the position that it would have been obvious to heat treat a p-GaN with Co in a nitrogen atmosphere as an alternative to oxygen atmosphere.

Uemura discloses that the Co layer of the electrode can be heat treated in an atmosphere comprising N₂, He, O₂, Ne, Ar or Kr. *See* col. 4, lines 34-44 and col. 9, lines 50-64. Although Uemura discloses heat treating a Co layer of an electrode in an atmosphere that may not contain oxygen, Uemura does not disclose heat treating a gallium nitride-based compound semiconductor layer and catalyst metal layer containing Ni, where the catalyst layer is then removed prior to depositing the electrode. In addition, annealing a gallium nitride-based compound semiconductor layer and catalyst layer at a temperature of 200 to 600 °C is not disclosed.

Since neither reference discloses heat treating a metal catalyst layer containing Ni in an atmosphere containing no oxygen, there is no motivation in either reference that would lead one of ordinary skill in the art to arrive at the present invention.

Therefore, Ito and Uemura do not teach or suggest the method of the present invention.

Accordingly, withdrawal of the foregoing rejection is respectfully requested.

In conclusion, the §103 rejection should be overcome, and in view of the above, it is respectfully submitted that the claims are in condition for allowance.

Reconsideration and withdrawal of the rejection is respectfully requested, and allowance of claim 8 at an early date is respectfully requested.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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